

The Dynamical Reference Frame

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The reference frame of the more recent JPL Lunar and Planetary Ephemerides is now the ICRF (International Celestial Reference Frame). This has been made possible by the inclusion of two new data types into the observational data set to which the ephemerides are adjusted. Namely, 1) a frame-tic determination using Lunar Laser Ranging, geodetic surveys and VLBI station locations and 2) VLBI observations of spacecraft near a planet (Magellan at Venus, Phobos at Mars). As a result, the inner four planets have been tied to the ICRF.

Various measurements (ranging and orbit determination of the Pioneer and Voyager spacecraft, VLA measurements of thermal emission, VLBI of the Ulysses spacecraft) theoretically tie Jupiter onto the ICRF also. On the other hand, the optical transit observations of Jupiter are referenced to the J2000, so a rotation between the two frames is determined and applied. The size of the rotation, though, is larger than what is expected from other sources. This inconsistency may be better understood when the VLBI observations of the Galileo spacecraft in September and October are processed and analysed.

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